

# Is magnetic resonance imaging necessary for every patient with low back pain?

Magnetic resonance imaging, low back pain

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## Abstract

**Aim:** The aim of this study is to evaluate lumbar magnetic resonance imaging findings in patients with low back pain to reveal the relationship between clinical pain and magnetic resonance imaging findings.

**Material and Methods:** This was a retrospective study. For all participants, age, gender, visual analog scale (VAS) score, and magnetic resonance imaging findings were recorded. Participants were divided into 2 groups according to magnetic resonance imaging results, with normal magnetic resonance imaging findings in Group 1 and pathological findings in Group 2. Gender, age, and visual analog scale scores were compared between groups. In addition, magnetic resonance imaging pathologies were grouped by number of patients, age, gender, and visual analog scale score. The most common magnetic resonance imaging findings and accompanying clinical data were reviewed.

**Results:** Mean visual analog scale scores were found to be  $5.5 \pm 1.70$  and  $7 \pm 1.56$  with no statistically significant difference between Group 1 and Group 2, respectively ( $p=0.055$ ). The number of patients with a single magnetic resonance imaging finding was 90. Among these, bulging was the most common with 54 patients; among these patients, the mean age and visual analog scale scores were lower. Patients with canal stenosis and spondylosis had higher ages and visual analog scale scores. Coexistence of flattening and bulging in 20 (8.3%) patients and the association of protrusion, flattening, and spondylosis in 20 (8.3%) patients represented the most common combinations of multiple magnetic resonance imaging findings.

**Discussion:** Magnetic resonance imaging does not usually alter clinical results in cases of low back pain without serious underlying symptoms. Routine lumbar magnetic resonance imaging should be avoided in patients with acute or subacute low back pain without symptoms suggestive of a serious underlying condition.

## Keywords

Low Back Pain, Magnetic Resonance Imaging, Lumbar

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## Introduction

Low back pain (LBP) is a common health problem in society and can occur at any age, causing serious socioeconomic losses [1, 2]. Epidemiological studies evaluating the prevalence of LBP in adulthood throughout the world are available, revealing that the prevalence is 12% instantaneously, 23% monthly, 38% annually, and approximately 40% throughout life, while the lifetime prevalence in Turkey is 50% in urban areas and 80% in rural areas [3-5].

It is not easy to determine the specific etiology of LBP. It may occur as a result of a specific pathophysiological mechanism such as lumbar disc herniation, infection, inflammation, osteoporosis, rheumatoid arthritis, fracture, or neoplastic, or it can be observed to be nonspecific [6].

The majority (97%) of cases of LBP are mechanical. This can be defined as a clinical picture that develops as a result of excessive use, strain, traumatization, or deformation of the structures that constitute the spine [7, 8].

It should be kept in mind that radiological evidence has revealed that spine pathologies may not be associated with nonspecific LBP and that radiological changes can be seen at a substantial rate in society without any symptoms [9]. It should also be noted that performing many imaging studies without indication will not change the clinical results [10].

Radiological imaging methods are used in the evaluation of patients with LBP to examine the lumbar spine and its components. All imaging modalities can be used in the diagnosis of cases of LBP with the correct clinical indication. However, it is very important to use imaging methods according to a certain algorithm. Direct radiography before further imaging should be used for patients with neurological deficits, pain that does not go away despite all treatment and preventive measures, and urinary and/or stool incontinence.

Today, magnetic resonance imaging (MRI) is the most frequently requested imaging method for LBP patients. In a systematic review, eight studies investigating whether MRI findings identified patients with LBP and/or sciatica were examined, and two studies yielded statistically significant results between specific MRI findings and response to treatment, while the other studies showed discordance [11]. Degenerative findings and anatomical abnormalities may appear with MRI but their clinical significance is uncertain and controversial.

The aim of this study is to evaluate lumbar MRI findings in patients with LBP to reveal the relationship between clinical pain and MRI findings.

## Material and Methods

The patients who applied to our clinics with LBP complaints between January 1 and December 31, 2019, and who underwent lumbar MRI were reviewed retrospectively. Patient data were obtained from the hospital records system and age, gender, visual analog scale (VAS) score, and MRI findings were recorded. Individuals who had previously undergone back surgery and those who had received treatment in the last three months (medical or physical therapy, etc.) were excluded from the study. Participants were divided into two groups according to MRI findings, with normal MRI results in Group 1 and pathological results in Group 2. Gender, age, and VAS scores were compared

between groups. In addition, MRI pathologies were grouped by number of patients, age, gender, and visual analog scale (VAS) score. The most common MRI findings and accompanying clinical data were reviewed.

## Statistical Analysis

The SPSS 20.0 software program (IBM Corp., Armonk, NY, USA) was used for statistical analysis. Numerical data were presented as mean±standard deviations. The Kolmogorov-Smirnov test was applied for evaluating the distribution of numerical data. The independent samples t-test was used when the distribution of numerical data was normal, whereas the Mann-Whitney U test was used for abnormal distribution. In addition, the Kruskal-Wallis H test was used for comparison when the distribution was abnormal, whereas the Mann-Whitney U test was used for paired comparisons if the results were significant. The chi-square test was used for the comparison of nonnumerical data. Values of  $p < 0.05$  were considered statistically significant.

## Results

A total of 242 patients with mean age of  $41.89 \pm 17.21$  years were evaluated, 139 (57.43%) of whom were women while 103 (42.57%) were men. Eighteen had complaints of LBP but no findings on MRI, while 242 had MRI findings. Mean ages were  $28.55 \pm 11.19$  and  $39.00 \pm 17.18$  years in Group 1 (normal MRI results) and Group 2 (pathological MRI results), respectively, and the difference between the groups was statistically significant ( $p = 0.001$ ). VAS scores were  $5.5 \pm 1.70$  and  $7 \pm 1.56$  in Groups 1 and 2 and there was no statistically significant difference ( $p = 0.055$ ) (Table 1).

The number of patients with a single MRI finding was 90. Among these, bulging was the most common, observed for 54 patients. This subgroup also had a higher percentage of women, a lower mean age, and lower mean VAS score. Patients with canal stenosis and spondylosis had higher ages and VAS scores. All relevant data are given in Table 2.

Data for patients with multiple MRI findings are presented in Table 3. Coexistence of flattening and bulging in 20 (8.3%) cases and the association of protrusion, flattening, and spondylosis in 20 (8.3%) cases were the most commonly seen multiple MRI findings. The percentage of women was higher in this subgroup and patients with signs of spondylosis were older.

**Table 1.** Age, VAS score, and gender of all participants

	Group 1 (n=18)	Group 2 (n=224)	p
Age	28.55 (12-54)	39.00 (14-98)	0.001
VAS	5.72 (3-8)	7 (3-9)	0.055
Gender (Female/Male)	8/10	131/93	0.181

**Table 2.** Distribution of single MRI findings

	n	%	Age	VAS	Female/Male
Bulging	54	22.3	$35.87 \pm 2.06$	$6.40 \pm 0.20$	35/19
Protrusion	21	8.7	$39.28 \pm 3.00$	$6.80 \pm 0.35$	15/6
Extruded disc	8	2.5	$38.50 \pm 3.69$	$7.83 \pm 0.47$	1/5
Stenosis	2	0.8	$62.00 \pm 18.00$	8	1/1
Spondylodiscitis	2	0.8	$44.00 \pm 6.00$	$7.50 \pm 0.50$	0/2
Cervical lordosis	2	0.8	$41.50 \pm 13.50$	$7.00 \pm 1.00$	0/2
Spondylosis	1	0.4	62	7	0/1

**Table 3.** Distribution of multiple MRI findings

	n	%	Age	VAS	Female/ Male
Cervical lordosis, bulging	20	8.3	30.65±3.36	5.60±0.35	11/9
Protrusion, cervical lordosis, spondylosis	20	8.3	54.15±2.98	6.05±0.29	14/6
Protrusion, cervical lordosis	19	7.9	35.45±2.45	6.31±0.31	8/11
Spondylosis, bulging	11	4.5	50.09±4.05	6.18±0.37	8/13
Cervical lordosis, spondylosis, bulging	10	4.1	51.00±5.29	6.50±0.45	6/4
Protrusion, spondylosis	10	4.1	49.90±4.49	5.90±0.48	7/3
Protrusion, bulging	8	3.3	51.62±4.88	7.37±0.49	0/2
Spondylosis, stenosis, extruded disc	3	1.2	67.00±5.68	8.00±0.57	0/3
Extruded disc, spondylosis	3	1.2	47.33±11.89	6.00±1.5	1/2
Extruded disc, cervical lordosis	3	1.2	31.00±7.00	7.66±0.33	1/2
Spondylosis, bulging, stenosis	3	1.2	59.66±1.86	8.00±0.57	2/1
Protrusion, cervical lordosis, bulging, stenosis	3	1.2	38.00±16.04	7.33±0.33	0/3
Extruded disc, protrusion	2	0.8	45.50±4.5	6.00±2.00	1/1
Protrusion, cervical lordosis, spondylosis, stenosis	2	0.8	65.50±5.5	8.50±0.50	1/1
Protrusion, stenosis	2	0.8	34.00±14	4.50±1.5	1/1
Protrusion, cervical lordosis, bulging	2	0.8	33.00±13.00	5	0/2
Spondylosis, discitis	2	0.8	57.50±22.50	7.50±0.50	1/1
Stenosis, extruded disc	1	0.4	33	9	1/0
Extruded disc, protrusion, bulging	1	0.4	23	8	1/0
Extruded disc, spondylodiscitis	1	0.4	42	8	1/0
Extruded disc, cervical lordosis, protrusion	1	0.4	39	9	0/1
Protrusion, cervical lordosis, spondylosis	1	0.4	45	7	1/0
Cervical lordosis, spondylosis, bulging, stenosis, malignancy	1	0.4	80	9	1/0
Protrusion, bulging, malignancy	1	0.4	51	9	1/0
Bulging, stenosis	1	0.4	53	8	0/1
Spondylosis, stenosis	1	0.4	98	9	1/0
Protrusion, spondylosis, bulging	1	0.4	64	6	1/0
Protrusion, spondylosis, spondylodiscitis	1	0.4	73	8	1/0
Protrusion, spondylodiscitis	1	0.4	63	3	1/0
Cervical lordosis, spondylosis	1	0.4	70	4	1/0

## Discussion

In the present study, no correlation was observed between MRI findings and VAS scores. This suggests that the patients' clinical complaints are not correlated with MRI findings. Bulging was the most common MRI finding. Flattening and bulging was the most common combination observed in patients with multiple pathologies on MRI, followed by the combination of protrusion, flattening, and spondylosis.

Treatment decisions in cases of LBP depend on the results of physical examination and, if necessary, medical imaging. MRI is the most common method that specialist doctors apply for the detection of disorders in the lumbar vertebrae and attached discs. MRI also plays an important role in the detection of soft tissue disorders. Currently, however, the importance of identifying the source of LBP is unclear and controversial, with MRI findings such as disc herniation, facet joint arthropathy, and Modic changes (bone marrow and endplate lesions) being reported. Studies have presented conflicting results regarding the possible relationships between LBP and MRI findings

in symptomatic patients [9, 12]. While MRI is outstanding at imaging the spine, the causes of LBP are very diverse and few are detectable on MRI. The cause of LBP is often muscular in nature, including postural muscle tension or protective muscle spasms. MRI does not detect these causes or pain reflected from the internal organs [13].

Kjaer et al.'s study of 412 patients aged 40 years reported abnormal MRI findings, usually encountered in the lower lumbar region (L4-S1). In that study, reduced disc height in more than 50% of cases, 25-50% hypointense disc signals, annular tears, "endplate" changes, facet joint degeneration, asymmetry, and foraminal stenosis were detected [14]. In our study, 92% of the patients had abnormal MRI findings. The reason for this high rate is that the study enrolled only patients presenting with LBP. Another study found that disc degeneration was associated with pain in 164 men reporting LBP for 12 months. However, no relationship was found between pain and the number of degenerated discs [15]. In our study, no correlation was found between VAS scores and MRI findings such as spinal stenosis and spondylosis. Bulging on MRI was most common in our younger patients. These results show that routine lumbar MRI in patients with LBP without any serious underlying condition is a waste of time for both the patient and the doctor. Many studies have shown that the reason for application of MRI is often patient demand or the fear of litigation among healthcare professionals [16, 17]. Nevertheless, unnecessary imaging should be avoided to reduce exposure to unnecessary procedures.

The significance of MRI findings such as disc herniation, facet joint arthropathy, and spondylosis is unclear and controversial in identifying the source of LBP. Many MRI findings are also common in people without LBP, but they are usually more common in people with LBP [18, 19]. Research on the significance of MRI findings has been disappointing due to the lack of a widely accepted gold standard [20]. Whether or not MRI findings predict differential response to medical interventions should be investigated further [11].

MRI does not usually alter clinical results in cases of LBP without serious underlying symptoms. Therefore, routine lumbar MRI should be avoided in patients with acute or subacute LBP without features suggestive of a serious underlying condition.

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### Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

### Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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### Conflict of interest

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